

# 2021 Scholars

The Garden Club  
of America



## A NOTE FROM THE CHAIRMAN

“Every year I look forward to learning about the numerous talented students who receive GCA scholarships. They are truly amazing and will go on to safeguard our natural world. Your support is absolutely critical in building a better tomorrow.”

—Ari Novy, president and CEO, San Diego Botanic Garden, Caroline Thorn Kissel Summer Environmental Studies Scholarship, 2007



Please join the Scholarship Committee in welcoming the class of 2021 GCA scholars. They are highly motivated, immensely qualified, and impressive in their visions for a healthy future. Our scholars come from a diverse array of backgrounds and cultures, but they all share a love of nature and science. Many seek to help mitigate the effects of climate change in pursuit of their research. Learn about their varied projects on the following pages and on the GCA website.

This vital GCA commitment to education would not be possible without the faithful members and clubs who support these 28 scholarships. This year we were pleased to award more than \$300,000 to 61 scholars. An additional \$10,000 was given to 10 Hull Award recipients, who will be presented in the Fall 2021 *Bulletin* under the umbrella of the new Civic Improvement Committee.

A highlight of the year was the establishment of the new GCA Fellowship in Conservation Horticulture, endowed by a generous gift from Kathy Keller (Akron Garden Club, Zone X) and her husband, David Keller. This fellowship will promote plant conservation capacity and coordination among botanic gardens and/or public gardens in the US, through programs of Botanic Gardens Conservation International (US), Inc. Caleb Lumsden, an undergraduate at Cleveland State University, is our inaugural scholar and was awarded \$5,000. He will be working at Holden Forests & Gardens in Ohio to initiate a breeding program that aims to develop novel genotypes of eastern hemlock resistant to invasive pests. Thank you to the Keller family, and congratulations to Caleb Lumsden!

Importantly, the Scholarship Committee is excited to be launching a new initiative using Google Ad Grants for nonprofits, hoping to raise awareness of our merit-based scholarship program among students seeking funding support for their research. The breadth and diversity of our scholarships is worthy of more attention among undergraduates and graduate students in horticulture and many related fields.

Also noteworthy are the many ways we have reached out to our clubs and their members, including offering multiple videos showcasing GCA scholars easily used for club programs. Plus our scholar speakers list is growing monthly. We work with club leadership to curate the best speakers for multiple club gatherings.

Scholarship is about excellence, learning, and sharing. Thank you for sharing your enthusiasm and resources so that the GCA can continue to support more and more worthy scholars. Thank you for believing in the benefits of education and scientific research. Thank you so much for helping us enable scholars to pursue their dreams.

—Jane Ghazarossian, Chairman, Scholarship Committee

### SCHOLARSHIP COMMITTEE 2020–21

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## BOTANY

### The Anne S. Chatham Fellowship in Medicinal Botany

*Established in 1997 to protect and preserve knowledge about the medicinal use of plants by providing research support in the field of ethnobotany for recent PhDs or PhD candidates, this fellowship is administered by the Missouri Botanical Garden.*



### Evelyn Jane Abraham, PhD candidate in Plant Biology, The Pennsylvania State University

#### Biochemometrics for Unraveling Medicinal Plant Synergy: Techniques for Evaluating Basil Antibacterial Activity

Abraham's primary focus is biochemometrics, a natural-products approach combining analytical chemistry, bacterial assays, and multivariate statistics to identify novel compounds with medicinal properties. Currently she is applying biochemometrics to *Ocimum basilicum* (basil) to discover compounds in leaves that potentiate basil's essential oil bioactivity against *Staphylococcus aureus*.



### Elizabeth Green, PhD candidate in Ecology and Evolutionary Biology, University of Tennessee at Knoxville

#### Social Network Analysis of Hemp-Farming Communities in Appalachia

Green uses field observation, experiments, and mathematical modeling to test ecological and ethnoecological hypotheses in agricultural settings. Her research focuses on gaining a mechanistic understanding of how local ecological knowledge sharing within social networks of farmers can help to optimize secondary metabolite concentrations in hemp. Growing hemp in the Appalachian region of the US has only recently been legalized, with farmers consequently acting largely as their own research advocates.

Green's research will serve to facilitate more equitable farmer access to advanced management support, working to better farmer success.



### Hayley Prescott, PhD candidate in Pharmacognosy, Department of Biomolecular Sciences, University of Mississippi

#### Botanical Aphrodisiacs for Women's Health

A trained herbalist, Prescott is investigating botanical species traditionally used as female aphrodisiacs, hoping to lead to better treatment options for female sexual dysfunctions. In particular, she is seeking specialized metabolites of species that activate a receptor known to increase arousal and desire. Optimistic about the future of botanical medicine, she intends to elucidate the pharmacological mechanism of ethnobotanical aphrodisiacs.



### Cecelia Naomi Dailey, master's student, Biology, The Citadel

#### Vascular Flora of Two Conserved Tracts on the Black River, South Carolina

At two conservation sites on the Black River in rural South Carolina, Dailey has conducted baseline surveys and produced species checklists and essays on ecology available to the public. She is preparing her botanical studies for publication, including two surveys of vascular flora and notable collections of threatened plants. Over the summer she will make new collections of additional species and review over 800 specimens at The Citadel Herbarium.

**"So grateful to have the support of the GCA for my dissertation work! I encourage other plant ecologists to apply to their wonderful scholarship programs."**

—Megan Sullivan, PhD candidate, Yale School of the Environment; The Garden Club of America Awards in Tropical Botany, 2019



### Emma Rose Fryer, master's student, Biological Sciences, California Polytechnic State University, San Luis Obispo

#### Modeling the Community Assembly of the Vertic Clay Endemic Annual Plant Species of the San Joaquin Desert

Fryer is studying endemic annual wildflowers found in California's San Joaquin Desert and their adaptations to extremely harsh, high-in-clay (vertic), sodic soils. She will use field and greenhouse studies to determine the nature of this novel form of soil, examining how its combination with competition from an invasive annual grass shapes the community, causing the vibrant, patchwork-like patterns of color these species create during the San Joaquin Desert's famed superblooms.

### **The Joan K. Hunt and Rachel M. Hunt Summer Scholarship in Field Botany**

*Established in 2003, this scholarship encourages the study of field botany beyond the regular curriculum, thus promoting the importance of botany to horticulture.*



#### **Sylvi Oh, master's student, Plant Biology, Ohio University**

#### **Bird-Mediated Seed Dispersal of Forest Herbs in a Temperate Deciduous Forest**

Oh studies seed dispersal of herbaceous plants in temperate deciduous forests to understand the population dynamics of forest herbs. Limited by dispersal, forest herbs are under threat due

to human land use. Since birds are likely dispersers of forest herbs, she is studying the herbs' interactions with migratory birds passing through southeast Ohio.



#### **Ryan J. Schmidt, undergraduate, Ecology, Evolution, and Natural Resources Program, Rutgers University**

#### **Rediscovering the "Weeds" of New Jersey: Understanding the Distribution of Weedy and Nonnative Species in New Jersey through Specimen Collection**

Schmidt aims to gain insights into the current and past distributions of the "weedy" and nonnative plants of New Jersey through the use of recent and historical herbarium records. He will collect new herbarium specimens of many of these under-collected species present along the urban-to-rural gradient to understand their current impact and how their distribution has changed over time.

#### **The Garden Club of America Awards in Tropical Botany**

*Established in 1983 and administered by the World Wildlife Fund's Education for Nature Division, the award supports fieldwork in tropical forests for doctoral candidates in botany.*



#### **Laymon Ball, PhD candidate in Biological Sciences, Louisiana State University**

#### **Mutualisms, Mountains, and Machine Learning: Disentangling Drivers of Evolution in a Florally Diverse Neotropical Plant Clade, Hilliaeae (Rubiaceae)**

Ball will use a combination of fieldwork, machine learning, and phylogenetic comparative methods to disentangle abiotic and biotic drivers of evolution in an understudied group of Neotropical flowering epiphytes, Hilliaeae (Rubiaceae). She will travel to Costa Rica, the region with the greatest Hilliaeae species richness, to confirm pollinators, study plant-pollinator interactions, collect floral-trait data, and collect herbarium specimens.



#### **Nora Gavin-Smyth, PhD candidate in Plant Biology and Conservation, Northwestern University and Chicago Botanic Garden**

#### **The Diversity and Evolution of Impatiens in the Eastern Arc Mountains**

Gavin-Smyth uses field botany, herbarium research, and genomics to explore the phylogeography of impatiens in Tanzania's Eastern Arc Mountains. Her research investigates the processes underlying the current diversity and distribution of the 40-plus *Impatiens* species found only in the Eastern Arc to understand their evolution and conservation outlook. Using phylogenetics and population genetics together, she traces the origins of Eastern Arc impatiens, adding one of the only studies of plants to the discussion on evolution of the Eastern Arc's biodiversity.



#### **Peter Quakenbush, PhD candidate in Biological Sciences, Western Michigan University**

#### **New Field Collections of *Medinilla* (Melastomataceae) to Better Understand its Exceptional Diversity**

Quakenbush is pursuing a phylogenetic study of *Medinilla*, the second largest genus in Melastomataceae and one of the most taxonomically complex. He received his master's degree in botany from the University of the Philippines, where he got his start with this paleotropical plant group. Collecting additional samples from key regions such as Sri Lanka, the Philippines, and New Guinea will help to create a robust phylogenetic framework to better understand the systematics, biogeography, and character evolution of *Medinilla*.



#### **Anna E. Nordseth, PhD candidate in Ecology, Duke University**

#### **Regrowing an Endangered Forest: Dispersal and Recruitment Success of Four Primate-Dispersed Trees in a Fragmented Landscape**

Nordseth's research investigates the plant-animal interactions needed to maintain tree diversity and ecosystem function in tropical forests. She will evaluate primate foraging and feeding behavior to understand how primate-dispersed seeds move across the fragmented forests of Panama's Azuero Peninsula, helping to inform ongoing forest restoration efforts in the region.

### **The Zeller Summer Scholarship in Medicinal Botany**

*Established in 2003, the Zeller Summer Scholarship encourages undergraduate students to expand their knowledge of medicinal botany by pursuing summer study through course work or research projects.*



**Emily Edwards,  
undergraduate,  
Anthropology and Human  
Biology, Emory University**

**Inhibition of Drug-  
Metabolizing Cytochrome  
P450 Enzymes by  
Common Herbal Dietary  
Supplements**

This summer, Edwards will conduct a research project with the Quave Research Group, which focuses on drug discovery through ethnobotanical research. She will screen over 1,900 botanical extracts for inhibitory effects against drug-metabolizing enzymes, seeking to identify botanicals that could interfere with the metabolism of prescription drugs. By increasing understanding of medicinal botany, this project could improve the safety and efficacy of pharmaceuticals.

**Jointly funded by Middletown  
Garden Club and New Canaan  
Garden Club, Zone II**



**Charlotte Rose Bjorn  
Frisk, undergraduate,  
Environmental Studies and  
Peace Studies, College of**

**Saint Benedict and Saint  
John's University  
Nordic People and Plants**

In collaboration with the Nordic People and Plants project of the University of Oslo's National History Museum, Frisk will use qualitative data analysis to understand the origins of medicinal-plant knowledge. Specifically, she will research Viking-age texts to discern the extent to which Icelandic medieval medicinal manuscripts authored by Latin sources relied upon local Icelandic knowledge sources. The purpose of Frisk's research is to understand and conserve Nordic ethnobotanical heritage.

**COASTAL  
WETLAND STUDIES**

**The Garden Club  
of America Award  
in Coastal Wetland  
Studies**

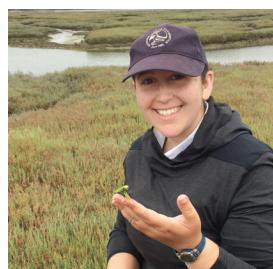
*Established in 1999  
to promote wetland  
conservation through the  
support of young scientists  
in their field work and  
research, this award is  
administered by the Center  
for Coastal Resources  
Management at the  
Virginia Institute of Marine  
Science of the College of  
William & Mary.*



**Brandon Quintana,  
master's student,  
Biological Science,  
California State University,  
Fullerton**

**Effects of Eelgrass Density  
on Filter-Feeder Biomass  
and Condition Index in  
a Multi-Habitat Living  
Shoreline**

Quintana is studying how biomass and condition index of filter feeders are responding to different factors such as sedimentation, as well as eelgrass and filter-feeder density, in a living shoreline setting. His research goals are to inform restoration management and better protect coastal communities while increasing habitat and biodiversity.



**Brittany Paige Wilburn,  
PhD candidate in  
Community Ecology and  
Environmental Science,  
Drexel University**

**Biochar Stability and  
Carbon Sequestration  
Capacity Across a Salinity  
and Plant-Community  
Gradient in New Jersey  
Tidal Marshes**

Wilburn's research focuses on the biogeochemistry of coastal

wetland-restoration projects. Specifically, she examines the effectiveness of adding biochar, a soil amendment made from organic materials, to salt-marsh sediments to increase plant vigor and long-term carbon burial. Biochar has been effective in agricultural systems, but little is known about its effects on coastal wetland sediments.

**CONSERVATION  
& ECOLOGICAL  
RESTORATION**

**The Garden Club of  
America Fellowship  
in Ecological  
Restoration**

*Established in 2000  
and administered by the  
University of Wisconsin-Madison Arboretum,  
this fellowship supports  
specialized graduate studies  
and research in ecological  
restoration, the active  
healing of land.*



**Adam Jacob Eichenwald,  
PhD candidate in  
Community Ecology and  
Environmental Science,  
Tufts University**

**Predicting Cascading  
Extinctions and a Potential  
for Restoration in the  
Mojave Desert**

Eichenwald investigates how knowledge of species interactions can be applied to environmental management.

**"Thank  
you, GCA  
Scholarships,  
for the  
incredible  
support during  
my graduate  
training! Those  
early career  
opportunities  
are key to  
launching a  
successful  
path!"**

—Cassandra Quave,  
associate professor,  
dermatology and  
human health, Emory  
University; PhD, biology,  
Florida State University;  
The Anne S. Chatham  
Fellowship in Medicinal  
Botany, 2007

**"I got my academic start in plant science and ecological restoration with a really meaningful Norweb Scholarship from your organization. I hope the award continues to mean as much to recent recipients and current scholars as it did to me over a decade ago."**

—Nate Hough-Snee, senior scientist-ecologist, Four Peaks Environmental Science & Data Solutions; PhD, ecology, watershed sciences, Utah State University; The Elizabeth Gardner Norweb Summer Environmental Studies Scholarship, 2007

He will examine whether the decline of the desert tortoise in the Mojave Desert negatively impacts other native species, as the tortoise digs burrows that other animals can use to escape from lethal summer heat. Analysis of how species in this community react to variations in the environment will provide critical information for adaptive management of the ecosystem, particularly as temperatures increase due to climate change.



**Sarah M. Klionsky, PhD candidate in Natural Resources and the Environment, University of Connecticut**

**Influence of Plant-Community Traits and Microtopography on Nitrogen Removal in Restored Wetlands on Former Cranberry Bogs**

Klionsky's research focuses on outcomes of wetland restoration on former agricultural land. She works in retired cranberry bogs, studying abiotic controls on vegetation response and how vegetation and microtopography interact to impact nitrogen dynamics. She aims to understand whether plant-community traits can be used to predict denitrification potential and how photogrammetric imaging can help scale results up to larger areas.



**Isabel de Silva, PhD candidate in Ecology and Evolutionary Biology, University of Colorado Boulder**

**Testing Temporal Insurance Effects and the Role of Niche Complementarity in an Experimental, Hydrologically Variable Invaded Riparian Plant Community**

De Silva's project utilizes an experimental riparian plant community to assess how using nonconventional planting mixes in restoration might promote sustained ecosystem functioning across environmental variability, testing whether variable species' responses across environmental conditions help to stabilize the overall function of the system. She is also assessing whether this approach helps ward off invaders by including species with complementary resource-use strategies.



**Tracy Youngster, PhD candidate in Ecology and Evolution, Rutgers University**

**Factors Influencing Native-Plant Establishment after Invasive *Phragmites australis* Removal Using a Novel Herbicide**

Youngster's research focus is plant-soil-microbe interactions in coastal systems. Her current project examines how herbicides used to kill *Phragmites australis* and other invasive plants affect soil conditions and subsequent native wetland plant establishment. She will be evaluating how various herbicides affect *Phragmites* rhizome decomposition and if soil amendments improve native-plant establishment after *Phragmites* is killed. This research will help guide best practices for restoring native wetland communities after invasive-plant removal.



**Delores McDowell, gap year, Bellevue College**

**Apprentice Crew Leader, SCA National Conservation Crew Program**

McDowell will participate in field training and protection of resources at one of America's national parks through the SCA's Summer Apprentice Crew Leader Program. She has worked as the nursery manager for the Washington Conservation Corps of the Snohomish Conservation District. In 2018 she was an SCA trail crew member at Kisatchie National Forest in Louisiana.

## **DESERT STUDIES**

**The Garden Club of America Award in Desert Studies**

*Established in 2006 and administered by the Desert Botanical Garden in Phoenix, this award enables graduate or advanced undergraduate students in horticulture, conservation, botany, environmental science, or landscape design relating to arid landscapes to further their studies of the arid environment, with preference given to projects that generate scientifically sound water and plant management.*



**Michael David Mohr,  
master's student,  
Landscape Architecture,  
Arizona State University**  
Desert Botanical Garden,  
Summer 2021

Mohr will research varied topics during the summer at the Desert Botanical Garden in Phoenix, Arizona. He will rotate among their multiple departments, including collections and planting design, pest management, and rare-species management and research.



**Iris J. Garthwaite, master's student, Environmental Sciences and Policy Program and The Center for Adaptable Western Landscapes, Northern Arizona University**

Using a Geographic Mosaic of Climate Variation to Assess Genetic versus Environmental Sources of Variation in *Populus fremontii* Leaf Venation

Garthwaite studies climate-change effects on Fremont cottonwoods, to conserve this iconic foundation tree species. Combining advanced histology and innovative

image-analysis methods, she uses the Southwest Experimental Garden Array and digital herbarium specimens to understand the relationship between climate and Fremont cottonwoods across spatial and temporal scales. Her goal is to communicate her findings to conservation practitioners to advance climate-related adaptive management strategies for southwestern riparian corridors.

## GARDEN HISTORY & DESIGN

### **The Garden Club of America Scholarship in Garden History and Design at the Archives of American Gardens**

*Established in 2001, this scholarship supports independent study in the field of landscape history and design. Preference is given to students planning to conduct research at the Archives of American Gardens of the Smithsonian Institution in Washington, DC.*



**Taylor Elyea, master's student, Art and Museum Studies, Georgetown University**

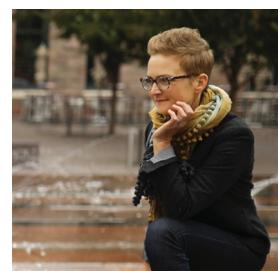
Aspiring Collections Manager

Elyea is pursuing a career

in museum-collections management. This summer, working at the Archives of American Gardens (AAG) of the Smithsonian Institution, she will catalog photographic materials in the AAG collection as well as new submissions to The Garden Club of America Collection. Elyea will also be engaging in the digital-asset management of newly digitized materials. Using her experience in the museum field, she will prepare these archival collections for research access and develop a range of outreach materials for public use.

### **The Douglas Dockery Thomas Fellowship in Garden History and Design**

*Established in 2000 to further the study of history and design in the American garden and also look to the future of gardens and their place in the environment, this fellowship is administered by the Landscape Architecture Foundation.*



**Anna Bierbrauer, PhD candidate in Design and Planning, University of Colorado Denver**

Erasure and Acceptance of Aridity in the American West

Bierbrauer's research combines political ecology, environmental history, and critical physical geography with landscape architecture and planning to understand historical and current equity issues related to water and vegetation in cities of the American West. Using geospatial methods, archives, and interviews, she will examine how cities have suppressed aridity in the past. As water resources become strained and climate patterns more extreme, this will contribute to an understanding of how cities can reintroduce aridity with a lens of equity and environmental justice.

## HORTICULTURE & RELATED FIELDS

### **The Catherine H. Beattie Fellowship in Conservation Horticulture**

*Established in 1983 and administered by the Center for Plant Conservation, a network of 40 botanical gardens in the US and Canada that is headquartered in Escondido, California, this fellowship promotes the conservation of rare and endangered flora in the southeastern United States by supporting field research by graduate students.*



**Bing Li, master's student, Plant Biology and Conservation Program, Northwestern University and Chicago Botanic Garden**

Using Genetic Data to Conserve a Rare Plant Species, *Oenothera organensis*, in New Mexico

Li's study focuses on the effects of cultivation and conservation practices on the genetics and floral traits of a rare evening primrose species, *Oenothera organensis*. She hopes to develop a conservation strategy for this species.



**Ryan O'Connell, PhD candidate in Ecology, Duke University**

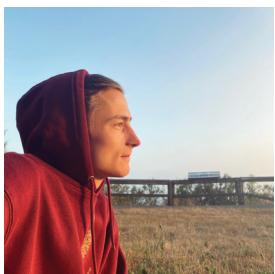
Measuring the Population Response of the Mountain Golden Heather to Multiple Forms of Environmental Stress

O'Connell's research centers around the ways populations respond to multiple sources of environmental stress, with an emphasis on human-related impacts. He is studying mountain golden heather

(*Hudsonia montana*) as a focal species in a series of field and greenhouse experiments aimed at understanding the threats facing this rare North Carolina endemic plant. This work will guide future restoration efforts for mountain golden heather and, if successful, could be applied to other threatened species.

### The Garden Club of America Fellowship in Conservation Horticulture

Established in 2020, this fellowship promotes plant-conservation capacity and coordination among botanic gardens and/or public gardens in the US through programs of Botanic Gardens Conservation International (US), Inc. (BGCI-US).



### Caleb Thomas Lumsden, undergraduate, Biological, Geological, and Environmental Science, Cleveland State University

#### Hemlock Woolly Adelgid Resistance Breeding

Lumsden's undergraduate research has focused on plant and microbial community composition, particularly on how communities are influenced by urbanization. With his GCA fellowship, Lumsden will be working at Holden Forests & Gardens (Ohio) to initiate a breeding

program that aims to develop varieties of eastern hemlock that are resistant to hemlock woolly adelgid, an invasive pest driving population decline in eastern North American forest systems. Lumsden will be working on various laboratory and greenhouse components of this project to develop these novel genotypes.

### The Katharine M. Grosscup Scholarships in Horticulture

Established in 1981, these scholarships are designed to encourage undergraduate and master's students in the study of horticulture and related fields.



### Emma Rose Brinks, undergraduate, Horticulture, Michigan State University

Brinks has worked on organic farms in England and Wales and is currently a horticultural assistant at MSU Radiology Healing Gardens. Highly involved in the MSU Student Horticulture Association, she is passionate about natural resources, vegetables, and horticultural education. Brinks hopes to be a part of the shift toward more-sustainable agriculture practices and food education. She plans to spend this summer working on a trail crew in the White Mountains.



### Alyssa Christine Hannigan, master's student, Landscape Architecture, Tyler School of Art and Architecture, Temple University

Hannigan's research is centered around the Holtwood Nature Preserve, a 132-acre nature preserve in Lancaster County, Pennsylvania. She will be completing a master plan, a detailed design, and an ecological restoration and monitoring plan for the nature preserve. Her research looks at how responsible site design aids in the preservation of sensitive ecological landscapes, promotes public engagement, and molds visitor perspectives into an ethic of care.



### Jenna Happach, master's student, Landscape Architecture and Ecosystem Services and Management, School for Environment and Sustainability, University of Michigan

Happach employs ecological principles and focuses on evidence-based design while

integrating practices in social sciences and environmental justice. Her capstone project includes working on an interdisciplinary team to review and update a long-term restoration and management plan, as well as developing a community engagement plan for Michigan Audubon's Bernard W. Baker Sanctuary. She designed an educational garden for the site that showcases native-plant species that support birds and will be leading a team in its installation.



### Josey Marie Kronewitter, undergraduate, Horticulture, Purdue University

This summer, Kronewitter will be exploring her passion for floral design at Blush Botanicals, a floral- and event-design company in San Diego. After discovering her love for floral arranging through an internship, she is eager to share the beauty of floral work with others by taking a larger step into this industry. Kronewitter plans to continue gaining experience in expressing her creativity while learning from the professionals who have inspired her.



### Nathan Patrick James, undergraduate, Horticultural Science, Michigan State University

James's experience includes working at a midwestern wholesale nursery that specializes in sustainable vertical gardens and living roofs. Through his interest in sustainability, he is currently conducting soil research in preserved dune lands, which encompasses gathering information on soil texture and structure, density and weight relationships, and levels of soil organic matter. This summer, he will be working with a landscape design firm. James hopes to combine his love of sustainability and horticulture by working in the green industry.



### Allison Miller, undergraduate, Landscape Architecture, Purdue University

A Presidential Scholar, Miller is a member of the Purdue American Society of Landscape Architects (PASLA) and was on the winning team of Purdue's annual Unilock Challenge. She is passionate about designing spaces that are sustainable, beautiful, and functional. Miller is

spending the summer of 2021 researching the field of landscape architecture in Charlotte, North Carolina.



**Grace Elizabeth Moore, undergraduate, Sustainable Food and Farming Systems, Purdue University**

Moore became interested in sustainable agriculture and food deserts while volunteering at the GroW Community Garden in Washington, DC. She has spent the past year spreading her love of local agriculture and teaching others about small farms as president of the Purdue Student Farm Organization and will spend this summer researching soil conservation with the USDA Natural Resources Conservation Service. Moore hopes to one day utilize local agriculture to heal food deserts, combining her love of sustainable agriculture with her passion for accessible food systems.

### **The Corliss Knapp Engle Scholarship in Horticulture**

Established in 2010 to encourage the development of research, documentation, and teaching skills in the field of horticulture, this scholarship honors the memory of the exceptional and inspiring Corliss Knapp Engle, a longtime member of

*Chestnut Hill Garden Club, Zone I. The scholarship is open to undergraduate and graduate students, advanced-degree candidates, and nondegree-seeking applicants above the high school level.*



**Adam D'Angelo, PhD candidate in Plant Breeding and Plant Genetics, University of Wisconsin-Madison**

#### Breeding Beets for Flavor and Eating Quality

D'Angelo's research is focused on improving the flavor and eating quality of table beet, *Beta vulgaris*. By reducing levels of geosmin (the chemical associated with the "earthy" flavor in beets) and oxalic acid (a compound that influences mouth feel and nutritional quality), he hopes to develop new beet varieties that are as tasty as they are beautiful and can be consumed as a healthy, fresh-eating vegetable.



**Blaire Mallory Kleiman, master's student, Plant Ecology and Agroecology**

### **Florida International University**

#### **Plant-Insect Interaction in Mango (*Mangifera indica*) Production**

Kleiman's thesis research is on the weed-insect interactions on mango farms in the agricultural area near Homestead, Florida. Her research assesses the possible benefits flowering weeds provide to beneficial insects such as pollinators, parasitoids, and predators, increasing their diversity and abundance. This could potentially increase the production of mangoes, a pollinator-dependent tropical crop; reduce the amounts of pesticides used; elucidate the interactions of both native and invasive arable weeds; and increase the resilience of farms to environmental changes.



**Jessica D.V. LaBella, undergraduate, Molecular Biology, West Virginia Wesleyan College**

#### Harnessing the Leaf Microbiome to Determine Disease Resistance in Wild Crabapples

Currently a member of the Wei Lab at Holden Arboretum in Cleveland, Ohio, LaBella studies the evolutionary ecology of plant adaptation to environmental change in species of wild apples and wild strawberries. At the Wei Lab, she will integrate

manipulative experiments, field collections, microbe culturing, and microbiome sequencing to explore interesting questions about plant disease susceptibility and resistance.



**Gabriela Christiane Sinclair, PhD candidate in Horticulture and Agronomy, Research Assistant in Viticulture and Enology, University of California, Davis**

#### Viticulture and Drought Stress

Sinclair researches the impact of drought on grapevine performance as well as the physiological mechanisms that drive cultivar variation and their contrasting response to water stress. Her findings will provide insight into the adaptations that make certain plant genotypes better than others at coping with water stress. She hopes to pursue these research interests while also promoting diversity and inclusion within her local viticulture community.

### **The Garden Club of America Hope Goddard Iselin Fellowship in Public Horticulture**

Established in 2013 and administered by the American Public Gardens Association, the fellowship furthers the study of public

**"It was so fun to share our work on invasive plants, birds, and private land conservation with the Winnetka Garden Club today! Scott Maresh and I always have a blast at garden clubs. We are forever grateful to GCA Scholarships for funding this work."**

—Jaime Coon, visiting assistant professor, Earlham College; PhD, natural resources and environmental sciences, University of Illinois at Urbana-Champaign; The Frances M. Peacock Scholarship for Native Bird Habitat, 2016

**"The GCA was one of the first organizations to take a chance on me. I can draw a direct line from that scholarship through to service in the Peace Corps, a National Science Foundation fellowship, my first job as a computational ecologist, and my current role."**

—Lucas Joppa, Chief Environmental Officer, Microsoft; PhD, ecology, Duke University; The Clara Carter Higgins Summer Environmental Studies Scholarship, 2003

horticulture through experiential learning that takes place at a recognized public garden, botanic garden, or arboretum within the US.



**Katherine Brewer, master's student, Horticultural Science, University of Minnesota**

**Restoring Prairie Dropseed in Minnesota Prairies**

Brewer's research focuses on establishing populations of prairie dropseed, a critical native grass in restored prairies. She conducts her research at the Minnesota Landscape Arboretum, which allows her to combine her love of public gardens with her interest in plant conservation and education.

**The Garden Club of America Montine M. Freeman Scholarship in Native Plant Studies**

*Established in 2017 to encourage the understanding and development of underutilized native plants, this scholarship is open to college undergraduates and graduate students, advanced degree candidates, or nondegree-*

*seeking applicants above the high school level to encourage the development of research, documentation, and teaching skills in the field of horticulture. It was made possible by utilizing surplus funds from the Montine M. Freeman Medal account and the generosity of the Freeman family.*



**Maria G. Alvarez Zavala, master's student, Plant and Environmental Science, New Mexico State University**

**Characterization of Nutraceutical Compounds and Detection of Glyphosate-Containing Herbicide Residues from *Opuntia* Species**

Alvarez Zavala's research measures medicinal compounds in two prickly-pear fruit cultivars; determines the amount of glyphosate residue on edible prickly-pear pads after drift from a simulated herbicide application incidence; and simulates human digestion of glyphosate-containing herbicide to measure bioavailability of the herbicide in the human gut. No known research has been done with herbicides, and this could provide new knowledge for existing cultivation practices.



**Lauren Elizabeth Redpath, PhD candidate in Horticulture, North Carolina State University**

**Evaluation of Population Structure in an Inter- and Intraspecific Diversity Panel of Blueberry**

Redpath is conducting a genome-wide association study in blueberry, using novel phenotypes of native species that have been hybridized into cultivated populations, to identify genetic markers associated with these traits. Hybridizing native species into commercial cultivars suffuses the population with new characteristics, such as fruit firmness and increased anthocyanins, as well as increasing heterogeneity. Through genetic understanding of these traits, her project will further leverage early generation testing to accelerate perennial plant-breeding programs.

related fields to study and conduct research in each other's country for one year.

**The Royal Horticultural Society Interchange Fellow**



**Grant Hughes, bachelor's degree, Horticulture, Iowa State University**

Interested in horticulture from an early age, Hughes received his Master Gardener certification from Iowa State University when he was only 13 years old. He has had multiple internships, including at the Arnold Arboretum in Boston, Massachusetts, and Lauritzen Gardens in Omaha, Nebraska, which have given him a number of experiences and driven his interest in public gardens. He looks forward to his time in the UK for the 2021 GCA/RHS Interchange Fellowship year, where he will continue to learn about public gardens, furthering his knowledge in ornamental horticulture, teaching, and highlighting the importance of these living museums.

**INTERNATIONAL WORK & STUDY**

**The Garden Club of America and Royal Horticultural Society Interchange Fellowships**

*Established in 1948, these two fellowships provide for a reciprocal exchange of British and American students in horticulture, landscape architecture, and*

## The Garden Club of America Interchange Fellow



**Matthew Jackson, bachelor's degree, Horticulture with Plantsmanship, University of Glasgow, master's student, Biodiversity and Taxonomy, Royal Botanic Garden, Edinburgh**

An avid horticulturalist, Jackson will be at Longwood Gardens for the 2021 GCA/RHS Interchange Fellowship year. He began gardening as an enterprising teenager at age 14 with a list of private clients. A lover of travel and adventure, Jackson enjoys visiting gardens and wild areas. He spent time in Thailand learning to be a divemaster, in Singapore at the National Orchid Garden, and on a grueling expedition to Nepal, which resulted in a publication on remote Himalayan botany. He also loves speaking on horticulture.

## The Rome Prize Fellowship in Landscape Architecture

*Established in 1928, this fellowship provides American landscape architects the opportunity for advanced study at the American Academy in Rome.*



**Phoebe Lickwar, associate professor, School of Architecture, University of Texas at Austin**

### Promiscuous Cultures: Agroecology and the *Orto Urbano*

Lickwar's project examines remnant and lost forms of traditional agroecology in the *fascia olivata* Assisi-Spoleto region of central Italy and speculates on how its recovery can inspire novel hybrid forms of urban agriculture in Rome. *Cultura promiscua*, or mixed cultures, refers to the cultivation of olives with grapevines, fruit trees, or grains, a cultural practice that resulted in surprising and complex strategies for shaping space by layering and overlapping distinct vegetal forms, exploiting verticality by attending to the unique morphological characteristics of each plant. She will create a series of hybrid drawings that analyze the forms and practices of *cultura promiscua* and tell the story of transformation in the region from a landscape of intensive mixed cultivation to one of extensive mechanized monocropping. Lickwar will then develop a series of speculative proposals for an agroecological *orto urbano* that reinterprets the principals and tactics of *cultura promiscua* for contemporary adaptation.

## NATIVE BIRD HABITAT

### The Frances M. Peacock Scholarship for Native Bird Habitat

*Established in 1994 and administered by the Cornell Lab of Ornithology in Ithaca, New York, the scholarship is awarded to college seniors and graduate students for the study of habitat-related issues that will benefit threatened or endangered bird species and inform land-management decisions.*



**Luke Matthew Douglas, master's student, School of Forest Resources, University of Maine**

### Rusty Blackbird Use of Commercial Spruce-Fir Forests of Northern New England

Douglas studies the rusty blackbird, one of the continent's most rapidly declining songbirds, which breeds in young spruce-fir stands adjacent to freshwater wetlands. His work focuses on the potential impacts of commercial logging practices, such as clearcutting and pre-commercial thinning, on rusty blackbird nesting and on fledgling habitat selection and survival. These efforts will contribute to the development of new

management guidelines for the species.



**Carl Pohlman, master's student, School of Forest Resources, University of Maine**

### Assessing the Long-Term Effects of an Expanding-Gap Silvicultural System on the Avian Assemblage at the Acadian Forest Ecosystem Research Program

Pohlman's research focuses on understanding how bird communities respond to an experimental forest harvest method based on the natural disturbance regime of the local forest. Conducted at the Penobscot Experimental Forest, his work aims to mimic natural processes such as tree mortality and changing forest structure.

*gifts given in honor of the GCA centennial by members of the Board of Associates.*



**Seanne Reyes Clemente, PhD candidate in Organismic and Evolutionary Biology, University of Massachusetts Amherst**

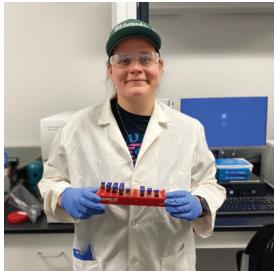
### Floral Volatiles and Pollinator Self-Medication: Implications for Bee and Plant Fitness

Clemente will conduct experiments to determine whether infection by a trypanosome parasite (*Criphidium bombi*) changes the foraging preferences of common eastern bumblebee (*Bombus impatiens*) workers. Through field surveys, Clemente will also determine parasite prevalence in wild bees foraging on patches of secondary compound-rich basil (*Ocimum basilicum*). This work is part of a larger investigation on whether pathogens influence the evolution of plant chemical traits by altering the foraging behaviors of their hosts.

## POLLINATOR RESEARCH

### The Garden Club of America Board of Associates Centennial Pollinator Fellowship

*Established in the spring of 2013 and administered by the Pollinator Partnership, this fellowship supports one or more graduate students to advance the knowledge of pollinator science. It was made possible by generous*



**Maura Jacqueline Hall, PhD candidate in Toxicology, Iowa State University**

**Quantification of an Agriculturally Prevalent Pyrethroid Insecticide in Honeybee Bodies to Determine Risk to Foraging Bees**

Hall's research focuses on assessing the exposure and risk of agricultural insecticides to insect pollinators, including honeybees and monarch butterflies. Her research goal is to better understand the potential adverse effects of pesticide exposure to pollinator habitat located near crop fields. The results from this research will help guide conservation efforts for pollinators within the north central US.



**Christopher Andrew Halsch, PhD candidate in Ecology, Evolution, and Conservation Biology, University of Nevada, Reno**

**The Interactive Effects of Pesticide Exposure and Climate Change on a Widespread Butterfly**

Halsch is interested in the many stressors impacting butterfly populations today, conducting long-term monitoring and laboratory experiments to examine the biological mechanisms underlying insect declines. His current projects investigate the interactive effects of pesticide exposure and climate change on butterfly population trajectories.

## SUMMER ENVIRONMENTAL STUDY

### The Caroline Thorn Kissel Summer Environmental Studies Scholarship

*Established in 2003 to promote environmental studies by students who are residents of New Jersey or nonresidents studying in New Jersey or its surrounding waters, this scholarship offers opportunities to gain knowledge and experience beyond the regular curriculum.*



**Lucia Weinman, PhD candidate in Ecology and Evolution, Rutgers University**

**Plant-Pollinator Mutualisms in Temperate Deciduous Forests: Understanding the Resource Use and**

### Functional Contributions of an Understudied Bee Fauna

Weinman studies the foraging patterns of bee species native to deciduous-forest habitat in the upper Midwest. To learn what plants forest bees depend on, as well as the bees' potential as pollen vectors for those plants, she is analyzing pollen that female bees collect to provision their larvae, as well as pollen that sticks to their bodies. Her work will provide important information for conservation and management of forest bee communities.

### The Clara Carter Higgins Summer Environmental Studies Scholarship

*Established in 1964 to encourage college students to further their studies and careers in the field of ecology, this scholarship offers opportunities to gain knowledge and experience beyond the regular curriculum.*



**Sarah Ellen Grimes, undergraduate, Biology and Psychology, Hope College**

### House-Sparrow Propagation Study

This summer, Grimes will participate in the Hope College summer research program, exploring how

house-sparrow song is impacted by habitat and urbanization. She will study how birdsong travels differently in urban and rural settings, utilizing both field and laboratory techniques. The results of this study will help understand how anthropogenic disruptions are altering the propagation of birdsong.



**Olivia Jakabosky, undergraduate, Conservation Biology and Ecology, Montana State University**

**Tropical Ecology Research Station Paraguay—Primates: An Interdisciplinary Study on the Effects of Anthropogenic Structures on Urban Howler Monkey Populations of Pilar, Paraguay, Through Local Ecological Knowledge and Naturalistic Observation**

Jakabosky will be participating in Para La Tierra's Tropical Ecology Research program with a concentration on primatology. She will evaluate the effects of anthropogenic structures on black-and-gold howler monkey behavior, locate areas of concern, and evaluate local perceptions of the issue.

## The Garden Club of America Awards for Summer Environmental Studies Scholarships

*Established in 1993, these scholarships encourage undergraduate summer studies in fieldwork, research, or classroom work in environmental studies beyond the regular curriculum.*



**Erica Lynn Collins, undergraduate, Biology and Environmental Science, College of William & Mary**

**Researching the Dispersal and Establishment of *Castanea dentata* (American Chestnut) Seedlings**

Collins will use mathematical models to research the dispersal and establishment of American chestnut (*Castanea dentata*) seedlings. The American chestnut is a critically endangered species due to the chestnut-blight fungus, and the knowledge gained from Collins's research will be useful to inform restoration efforts that enhance regeneration of blight-resistant chestnuts.

**Funded by Green Spring Valley Garden Club, Zone VI**



**Melissa Duda,  
undergraduate, Wildlife  
Management and  
Conservation, Unity  
College**

**A Case Study to Better  
Inform Land Managers:  
Using Floristic Data to  
Assess Fluctuations in  
Species Composition  
under Different Landscape  
Contexts**

This summer, Duda will be identifying environmental factors that impact prairies in Illinois. The findings will help ecological restoration managers better understand when and how often they should update their restoration goals.



**Nautica Tarez Jones,  
undergraduate, Biology,  
University of Louisiana  
Monroe**

**Reassessment of  
Vegetation in a Relic  
Louisiana Chenier**

In her thesis research, Jones will be assessing the diversity and abundance of native and invasive woody species within Louisiana's chenier forests. These coastal forests,

which protect against erosion and hurricanes, are at risk of being lost forever due to invasive species, climate change, and increased human activities. Jones's research goal is to understand the change dynamics of the chenier forests to inform efforts to conserve this ecologically unique and culturally significant community.



**Drew Tienken,  
undergraduate,  
Environmental Science  
and Political Science,  
University of Connecticut**

**Effects of Thin-Layer  
Placement Depth on  
Denitrification and  
Salt-Marsh Bacterial  
Communities**

Interested in sustainable wetland management and ecological restoration, Tienken will be conducting research in coastal Connecticut salt marshes. His project investigates the effects of "thin-layer placement," a restoration method that mitigates sea-level rise through its impact on dynamic salt-marsh bacterial communities.

**Jointly funded by Garden Club  
of Darien and Fairfield Garden  
Club, Zone II**

**The Mary T.  
Carothers Summer  
Environmental  
Studies Scholarship**

*Established in 2005, this scholarship is for undergraduate students who are doing summer fieldwork, research, or classroom work beyond their regular curriculum.*



**Autumn R. Banks,  
undergraduate, Biological  
Science, University of  
Pittsburgh**

**Independent Research  
in the Carson Lab at  
University of Pittsburgh**

Banks studies seed banks and how they affect the plant population above ground. This summer, she will collect soil samples to gauge seed quantity and diversity, studying how those seeds contribute to the plant population in an area disturbed by windstorms, logging, and grazing. This research will provide better understanding of how forests regrow after major disturbances.



**Sebastian McRae,  
undergraduate,  
Environmental Science  
and Sustainability,  
Allegheny College**

**Field Studies in Costa Rica**

McRae's study focuses on integrating humans into the landscape with sustainable agriculture, energy, water, and community architecture paradigms, utilizing frameworks such as permaculture and holistic management. This summer, he will travel to Atenas, Costa Rica, to study agroforestry and sustainable agriculture with the School for Field Studies.

**The Elizabeth  
Gardner Norweb  
Environmental  
Studies Scholarship**

*Established in 2005, this scholarship encourages undergraduate summer studies doing fieldwork, research, or classroom work in environmental studies beyond the regular curriculum.*

**"Grateful  
to GCA  
Scholarships  
for funding  
support during  
my PhD and  
their continued  
support as I  
transitioned  
from PhD to  
postdoc and  
soon postdoc  
to assistant  
professor!"**

—Rachael Bonoan,  
assistant professor,  
Biology Department,  
Providence College;  
PhD, ecology, behavior,  
and evolution, Tufts  
University; The Garden  
Club of America Board  
of Associates Centennial  
Pollinator Fellowship,  
2017

“Thank you, GCA Scholarships, for supporting [my] summer studies in tropical botany and ecology many years ago. The experience had a lasting impact.”

—Elysa Hammond, vice president of environmental stewardship, Clif Bar & Company; MPhil, agroecology and sustainable agriculture, Yale School of the Environment; The Clara Carter Higgins Summer Environmental Studies Scholarship, 1986



**Toshio Doroff Matsuoka, undergraduate, Environmental Science and Public Health, Alaska Pacific University**

#### Vegetation Change in the Brooks Range

Combining imagery from the moderate resolution imaging spectroradiometer (MODIS) sensor on NASA's satellite system with hundreds of miles of vegetation classifications across Alaska's Brooks Range, Matsuoka will research how the arctic vegetation landscape has been changing over the past 20 years. This summer, he will join an expedition traversing 800 miles of wilderness, starting in the central Brooks Range and ending at the Chukchi Sea. During the expedition, he will geolocate vegetation changes to validate trends recorded by MODIS.



**Sam Venker, undergraduate, in Biosciences and in Film and Photography, Rice University**

#### Sampling Sponges and Identification of Bacteria on Coral Reefs

Venker is currently a researcher in the Correa Lab, which specializes in the study of marine microbial communities and the ecology of coral reefs. This summer, he will investigate the sponge species *Clathrina lutea* in Mayaguez, Puerto Rico, collecting tissue samples to isolate its associated bacterial communities. He will identify the bacteria using sequencing techniques and measure their antibiotic-producing capabilities. This data will be useful for understanding the relationship between sponges and their bacterial symbionts and may also have pharmaceutical applications in humans.

### URBAN FORESTRY

#### The Garden Club of America Zone VI Fellowship in Urban Forestry

*Established in 2005 for advanced undergraduate or graduate students to study urban forestry and related subjects, this fellowship is administered by the GCA in collaboration with Casey Trees, Washington, DC.*



**Sharon Danielson, PhD candidate in Biology, Case Western Reserve**

#### University and Holden Arboretum

#### Investigating Variation in Stress Tolerance of Urban Tree Seedlings in Cleveland, Ohio

Danielson studies how urbanization impacts tree function, growth, and distribution. She measures a combination of physiological and functional traits related to water and nutrient use to explore individual responses and community-level trait shifts across urban and rural forests. Her current work explores the local variation in water-stress tolerance in seedlings from local urban and rural seed sources. This will provide insight into the trajectory of urban remnant forests and the potential benefits of using native seed sources for plantings.

**Funded by Casey Trees**

urban forestry professionals a method to utilize historical data sets in management decision making.

**Funded by Casey Trees**



**Renata Poulton Kamakura, PhD candidate in Ecology, Duke University**

#### Urban Tree Species Health and Habitat Suitability in a US City

Within cities, there is substantial variation in temperature, soil type, amount of pavement, and much more that can impact how well trees grow. As summers get hotter and rainfall patterns change, managers need to know which species can survive in different parts of a city and which ones will continue to do well in the future. Kamakura's research aims to support managers in making those decisions by investigating what keeps trees healthy and where different tree species grow well.

**Funded by Casey Trees**

**All scholar profiles in this report reflect the information current and available at time of publication.**

**All photos courtesy of the scholars**